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FIG. 1a

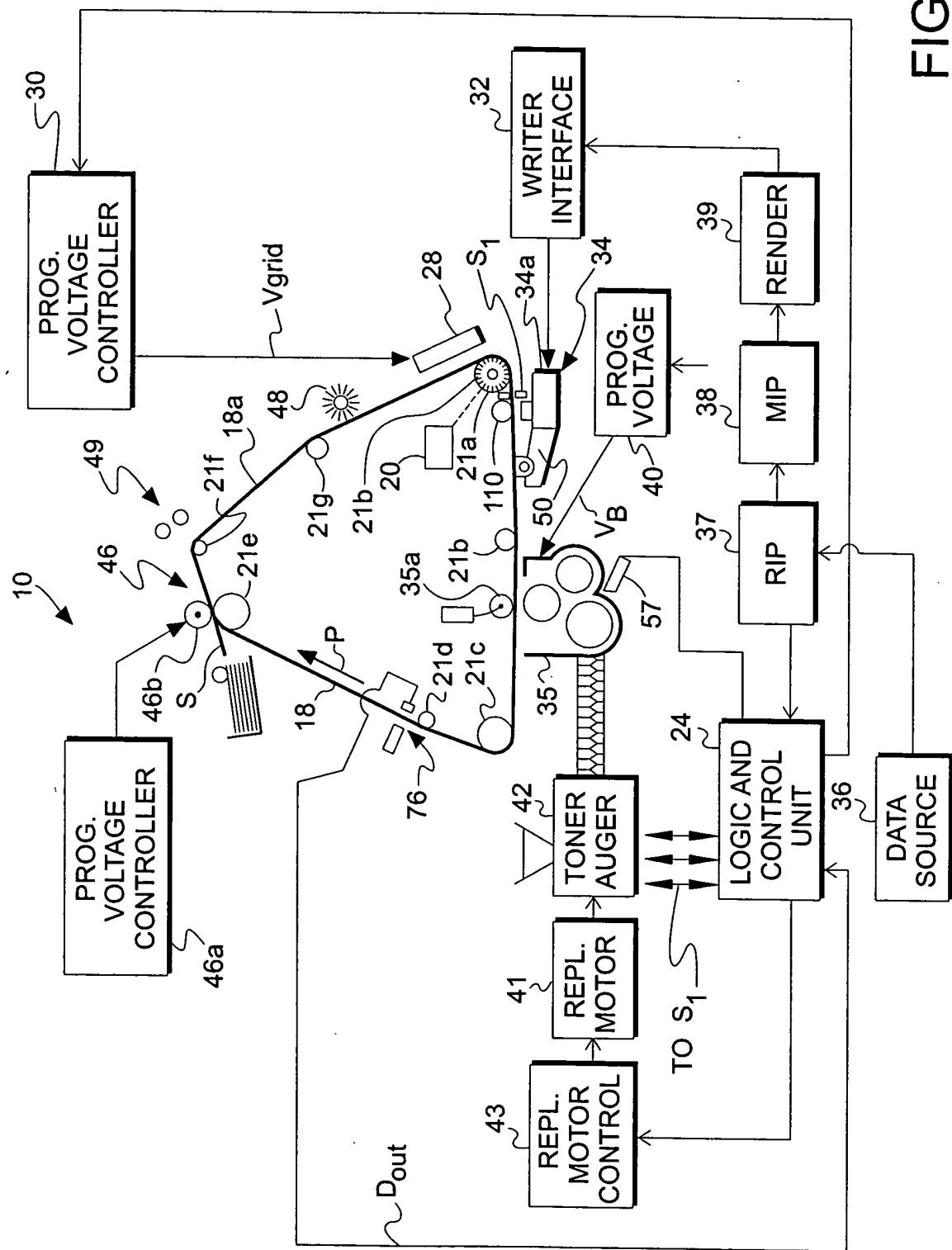
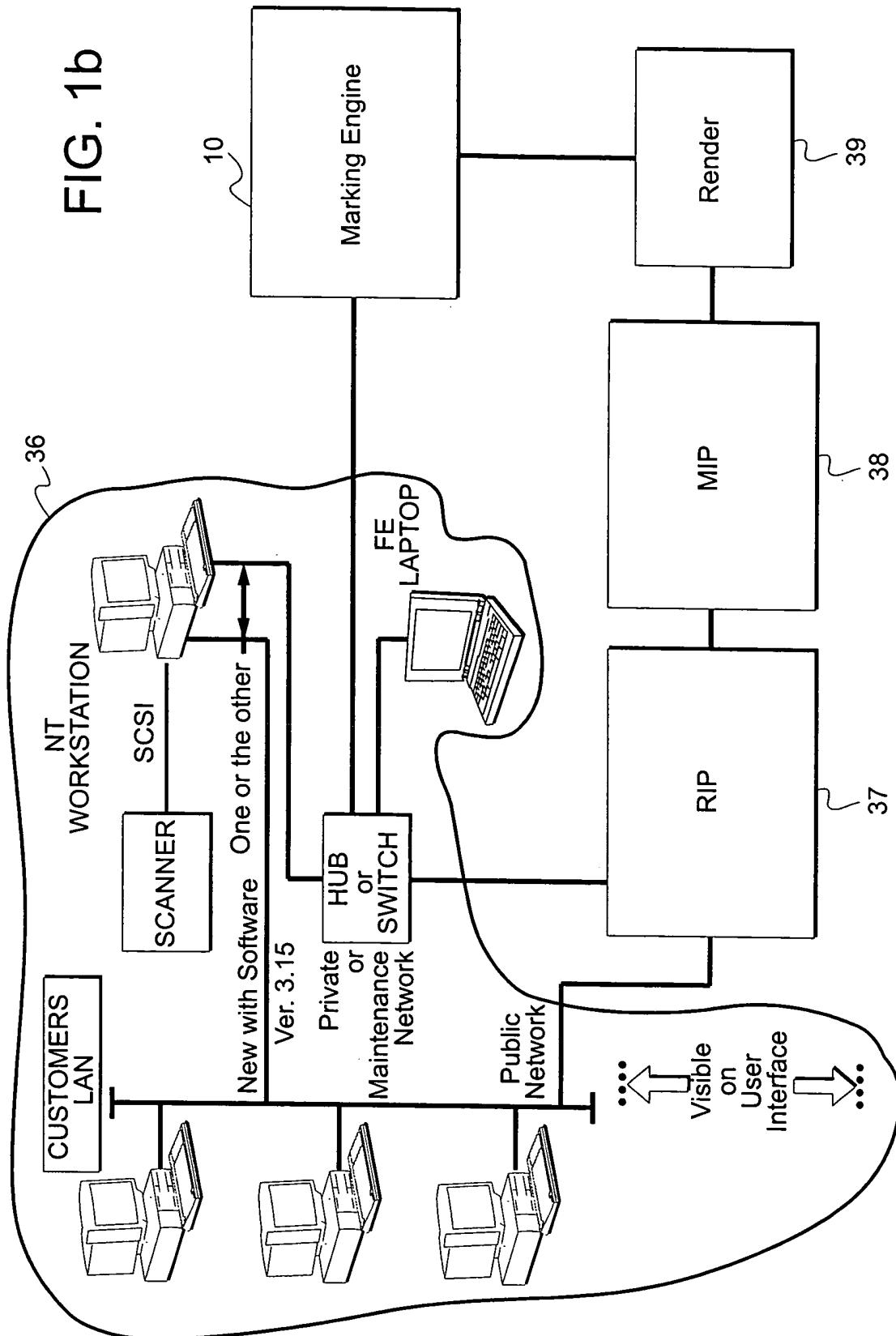


FIG. 1b



Algorithm Block Diagram

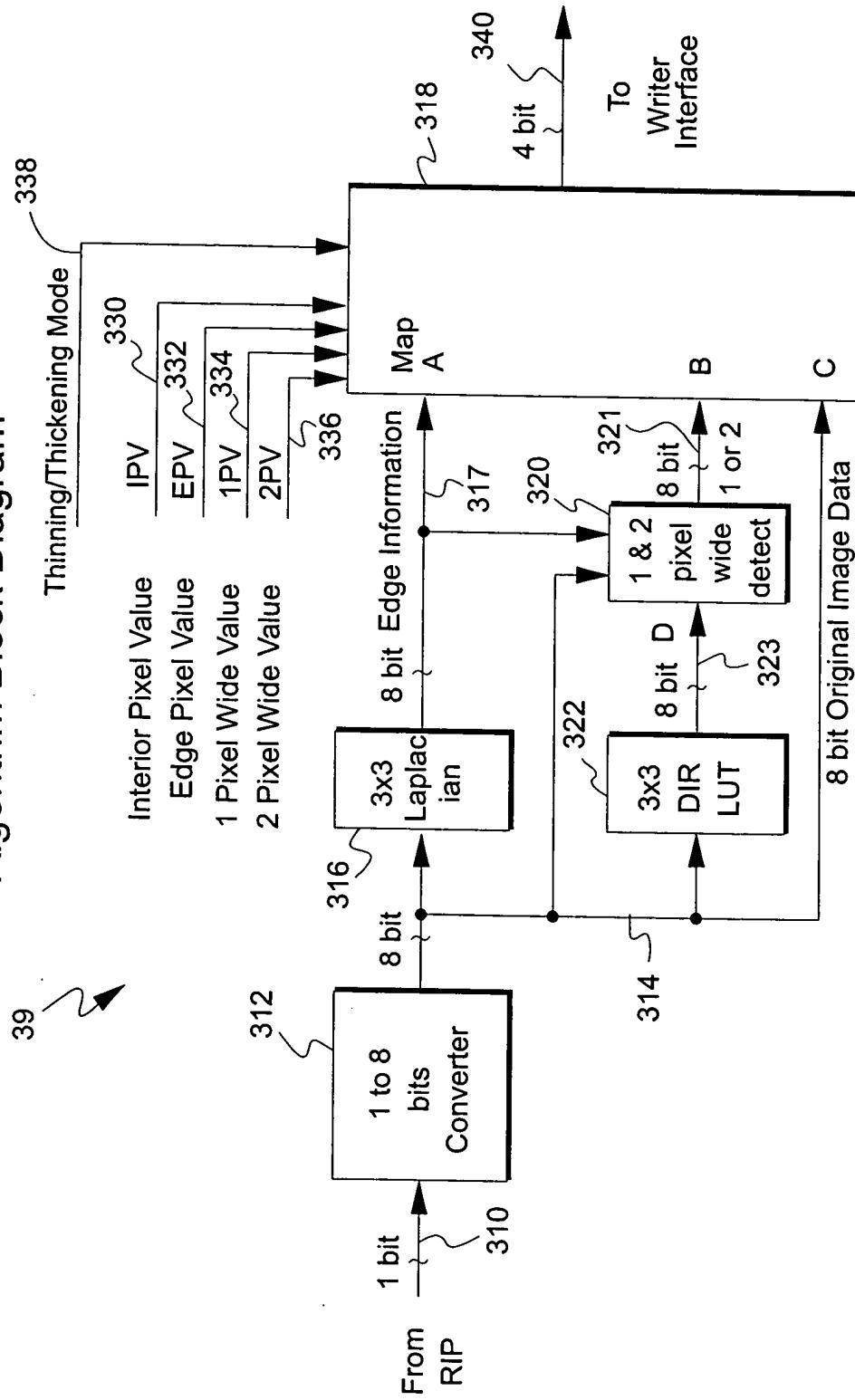


FIG. 2

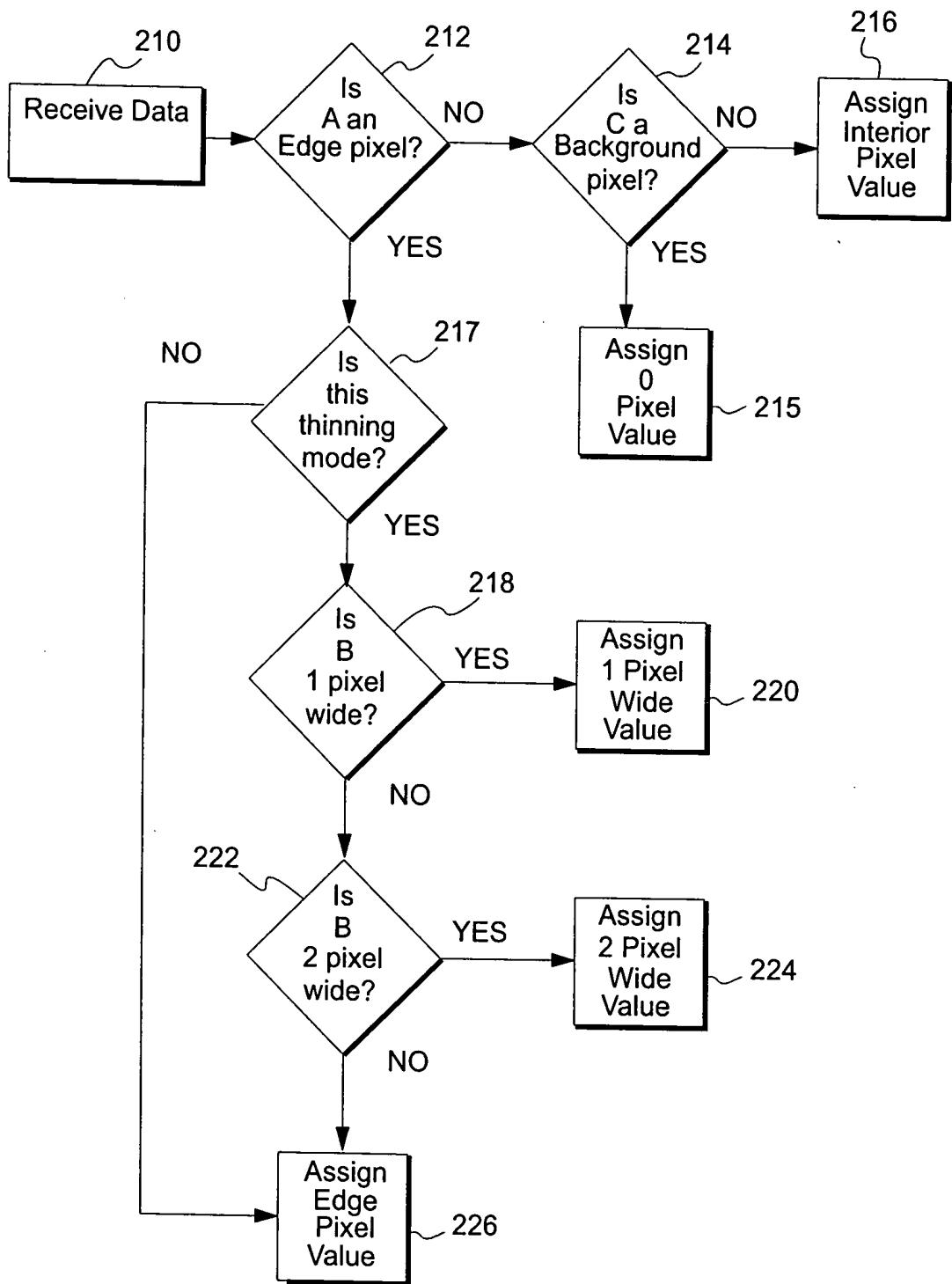


FIG. 3

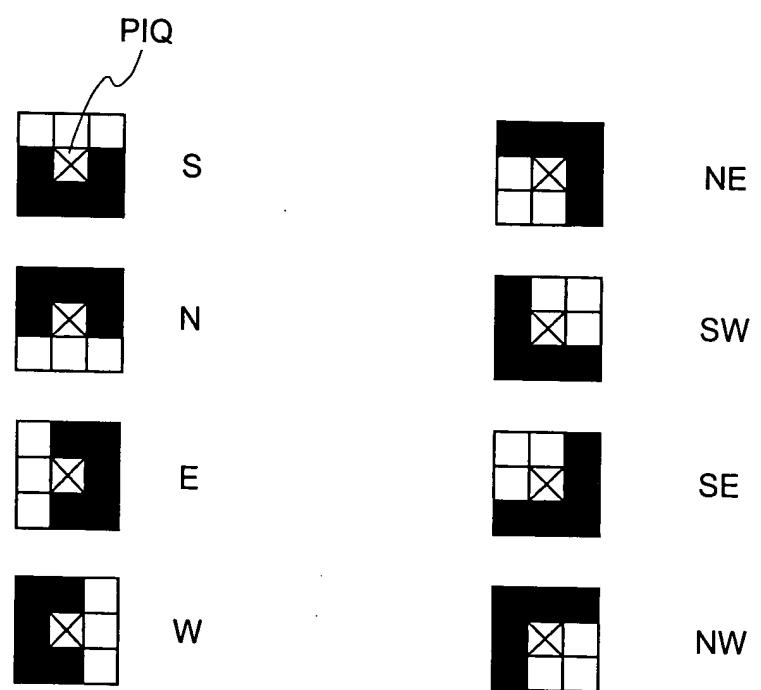


FIG. 4

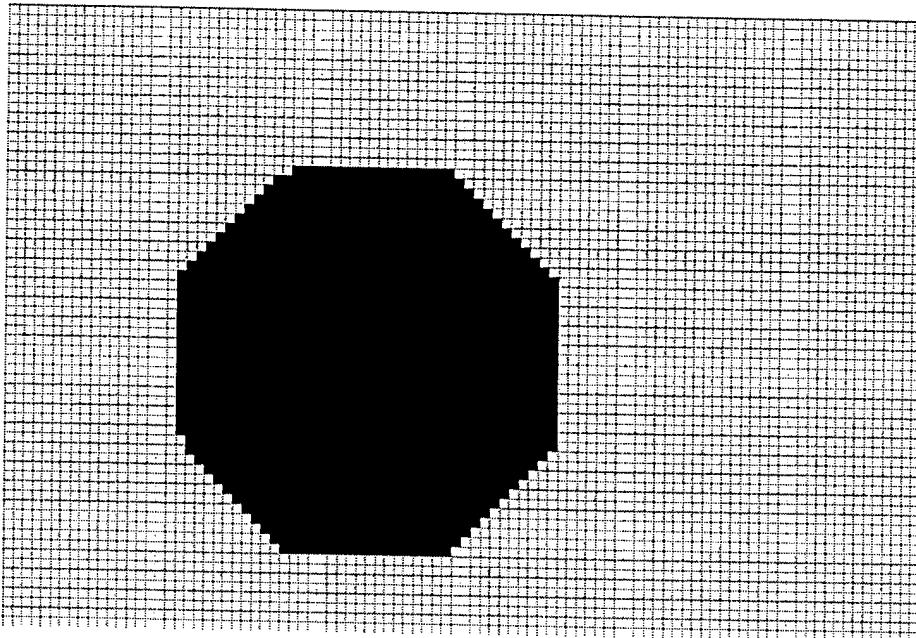


Fig. 5a
Original object bitmap

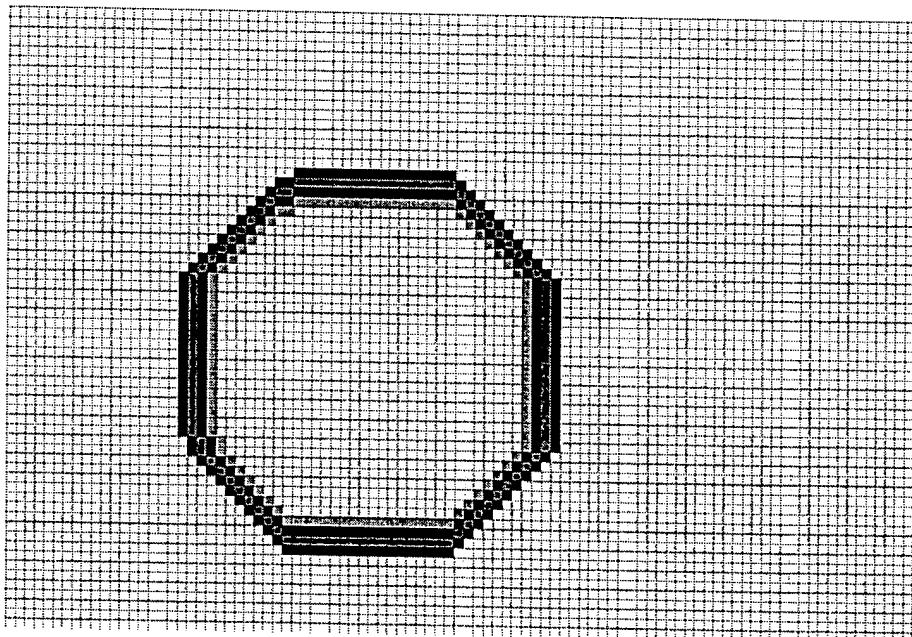


Fig. 5b
Four onion skin layers
when thinning

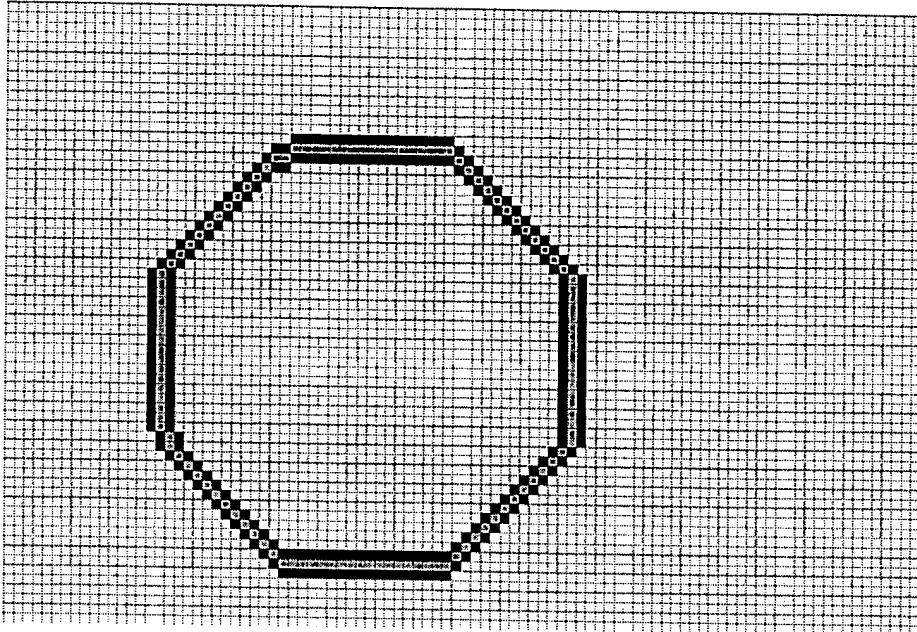


Figure 5c

Three onion skin layers
when thickening

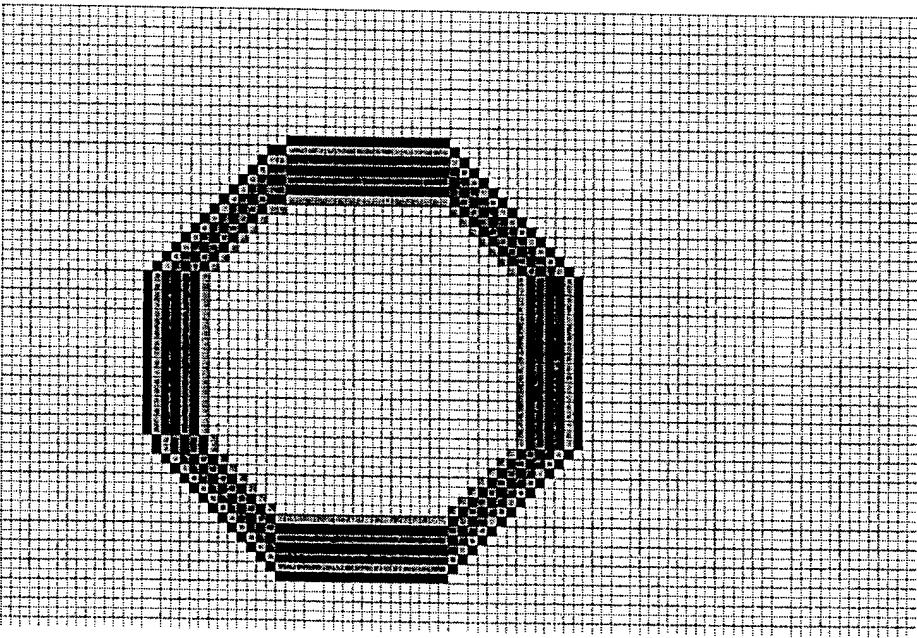


Fig. 5d

All layers
(thickening and thinning)

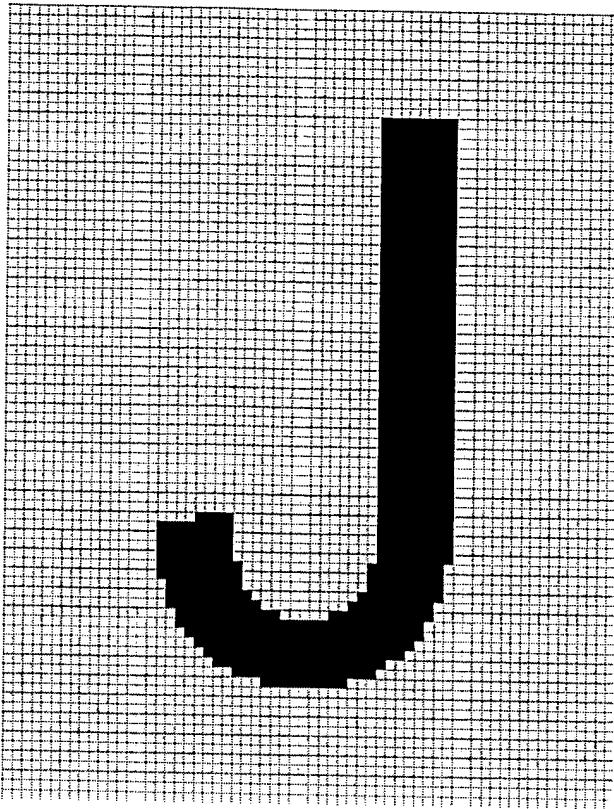


Fig. 6a
Original

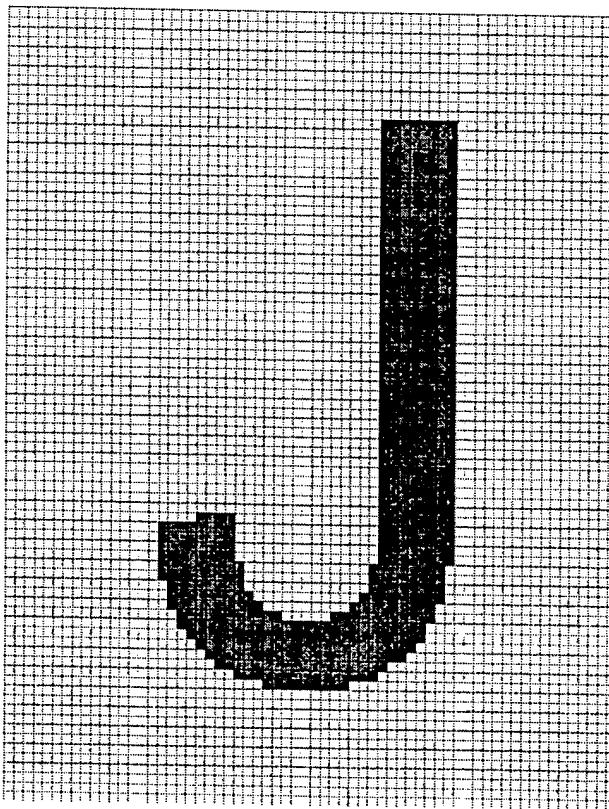


Fig. 6b
Same grey pixel value
assigned to edges and
solid area density

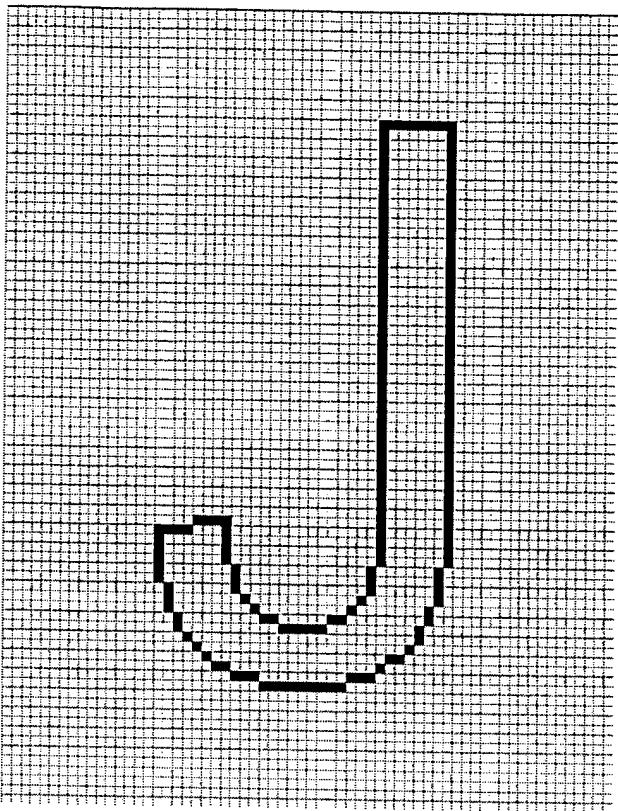


Fig. 6c
Edges when
thinning

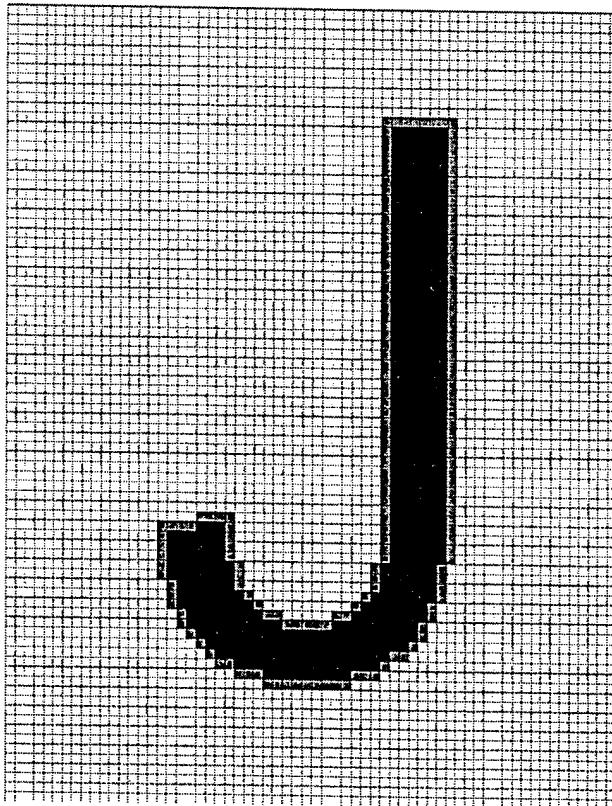


Fig. 6d
Lightened -
Solid area density reduced
Letter thinner

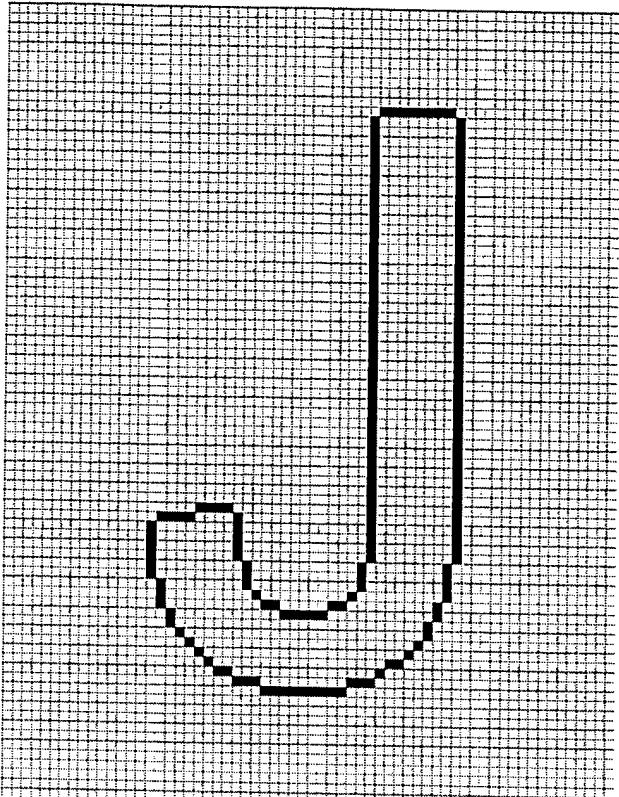


Fig. 6e
Edges when
thickening

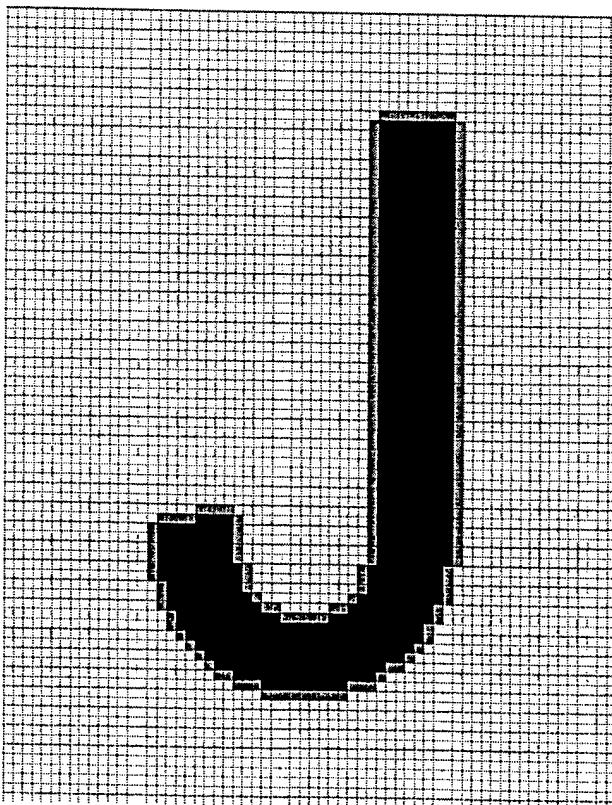
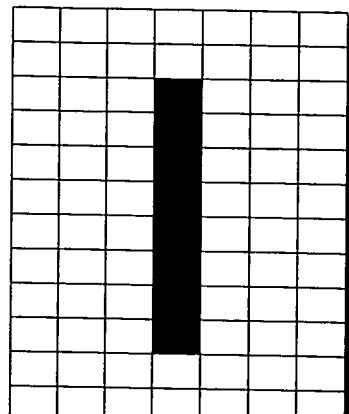


Fig. 6f
Thickened
Letter thickened by
applying grey edges which
were originally white



1 Pixel Wide Detection

Original 1 pixel wide line

FIG. 7a

0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	255	0	0	0
0	0	0	255	0	0	0
0	0	0	255	0	0	0
0	0	0	255	0	0	0
0	0	0	255	0	0	0
0	0	0	255	0	0	0
0	0	0	255	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

Edge Pixels

FIG. 7b

0	0	0	0	0	0	0
0	0	SE	S	SW	0	0
0	0	E	S	W	0	0
0	0	E	O	W	0	0
0	0	E	O	W	0	0
0	0	E	O	W	0	0
0	0	E	O	W	0	0
0	0	E	O	W	0	0
0	0	E	O	W	0	0
0	0	E	N	W	0	0
0	0	NE	NNW	0	0	0
0	0	0	0	0	0	0

Direction Values

FIG. 7c

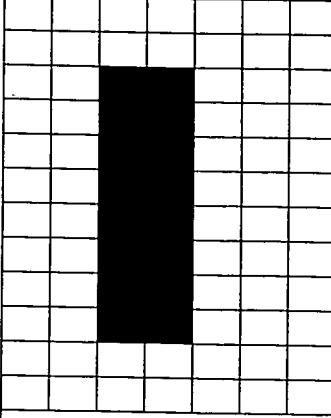
Assignment

Assignment BP: Background Pixel

BP: Background
EP: Edge Pixel

1W: One Pixel Wide Line

FIG. 7d



0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	255	255	0	0	0	0	0	0
0	0	255	255	0	0	0	0	0	0
0	0	255	255	0	0	0	0	0	0
0	0	255	255	0	0	0	0	0	0
0	0	255	255	0	0	0	0	0	0
0	0	255	255	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

0	0	0	0	0	0	0	0	0	0
0	S	E	S	S	SW	0	0	0	0
0	E	S	E	SW	W	0	0	0	0
0	E	E	W	W	W	0	0	0	0
0	E	E	W	W	W	0	0	0	0
0	E	E	W	W	W	0	0	0	0
0	E	E	W	W	W	0	0	0	0
0	E	E	W	W	W	0	0	0	0
0	E	N	E	N	W	W	0	0	0
0	N	E	N	N	N	W	W	0	0

BP									
BP									
BP	BP	EP	EP	BP	BP	BP	BP	BP	BP
BP	BP	2W	2W	BP	BP	BP	BP	BP	BP
BP	BP	2W	2W	BP	BP	BP	BP	BP	BP
BP	BP	2W	2W	BP	BP	BP	BP	BP	BP
BP	BP	2W	2W	BP	BP	BP	BP	BP	BP
BP	BP	2W	2W	BP	BP	BP	BP	BP	BP
BP	BP	2W	2W	BP	BP	BP	BP	BP	BP
BP	BP	2W	2W	BP	BP	BP	BP	BP	BP

2 Pixel Wide Detection

Original 2 pixel wide line

FIG. 8a

Edge Pixels

FIG. 8b

Direction Values

FIG. 8c

Assignment
BP: Background Pixel
EP: Edge Pixel
2W: Two Pixel Wide Line

FIG. 8d

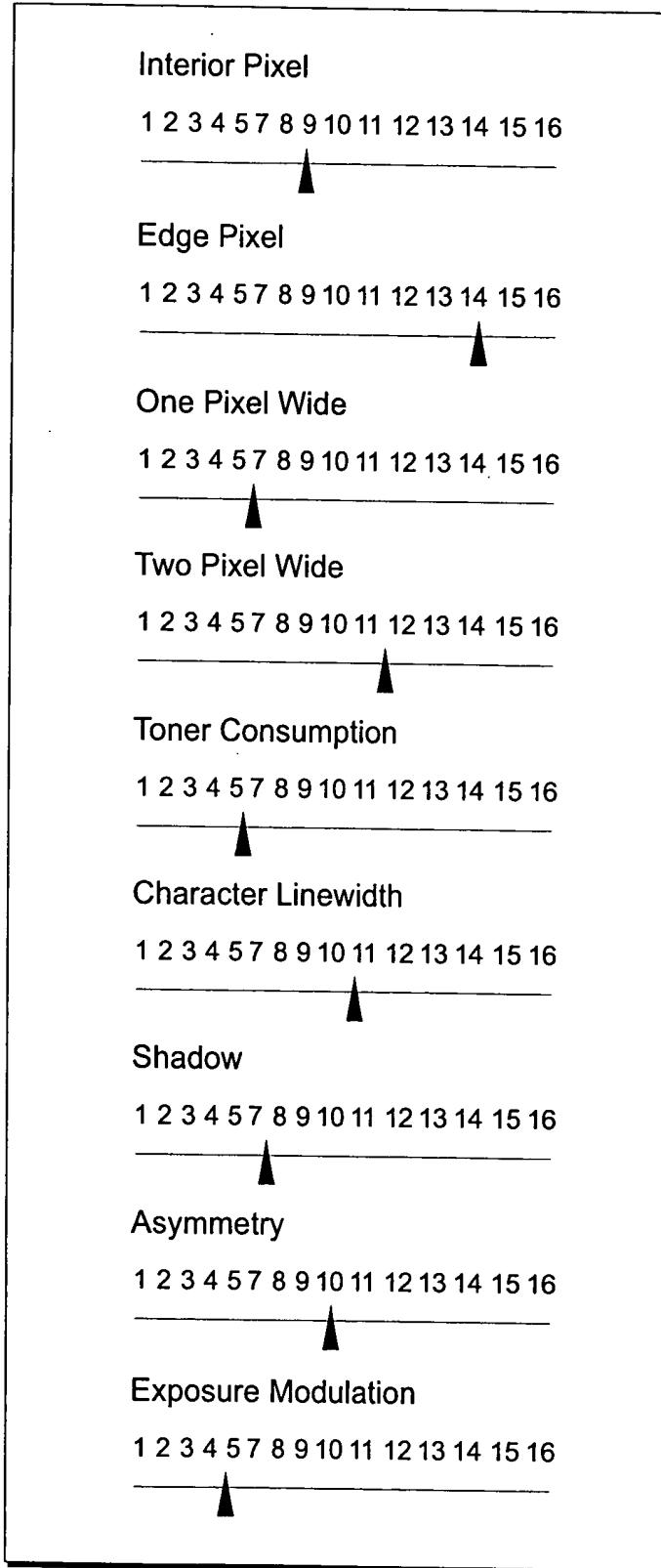


FIG. 9

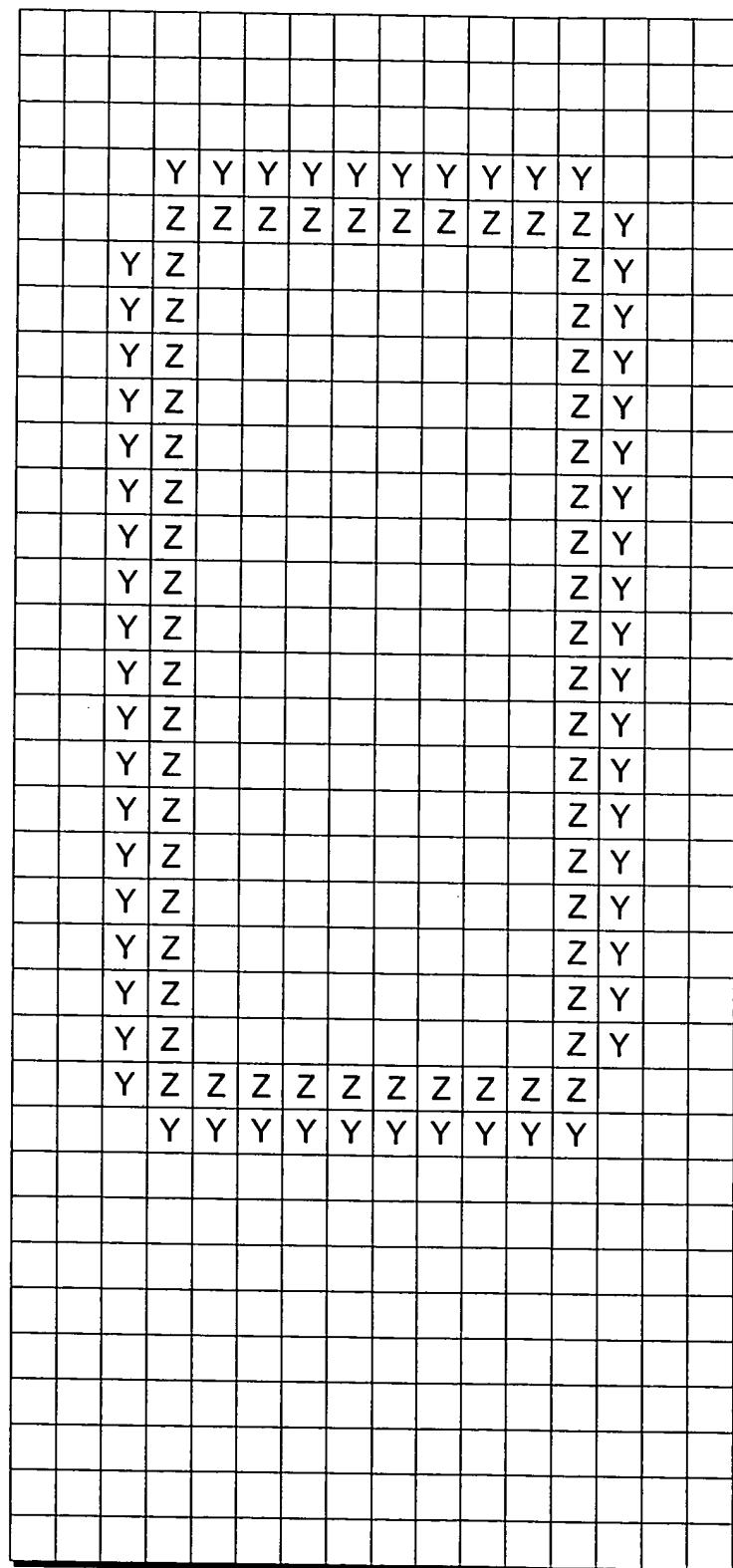


FIG. 10

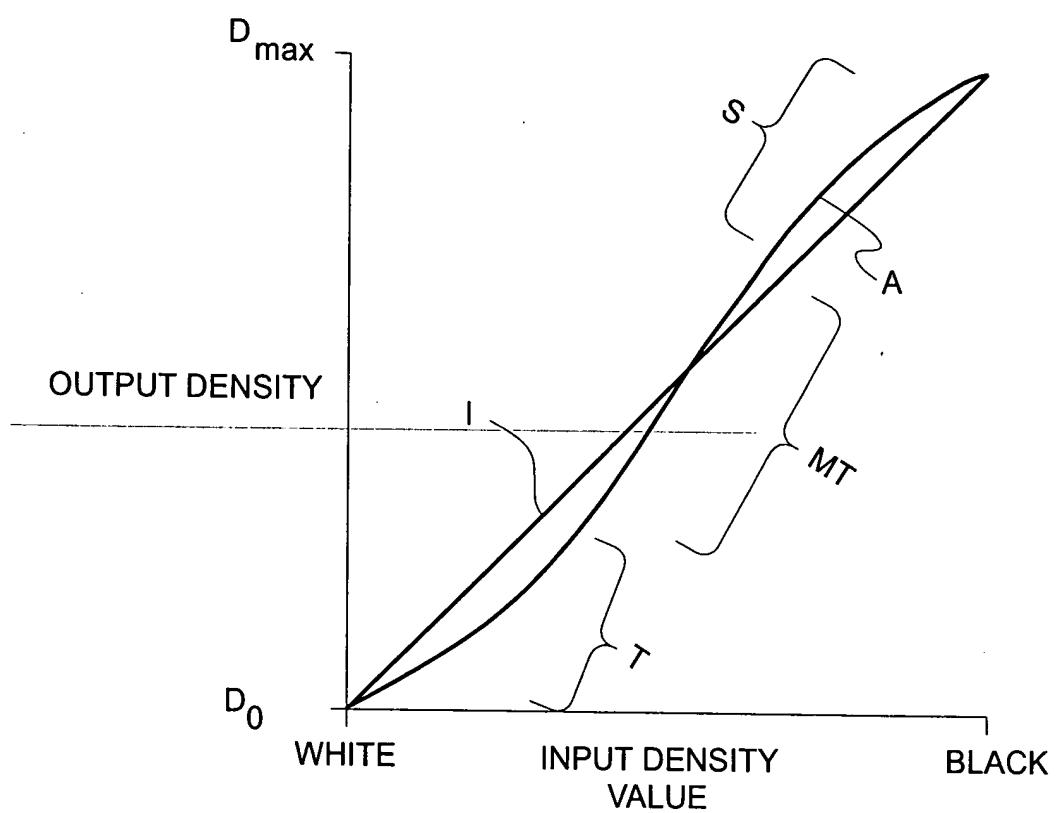


FIG. 11

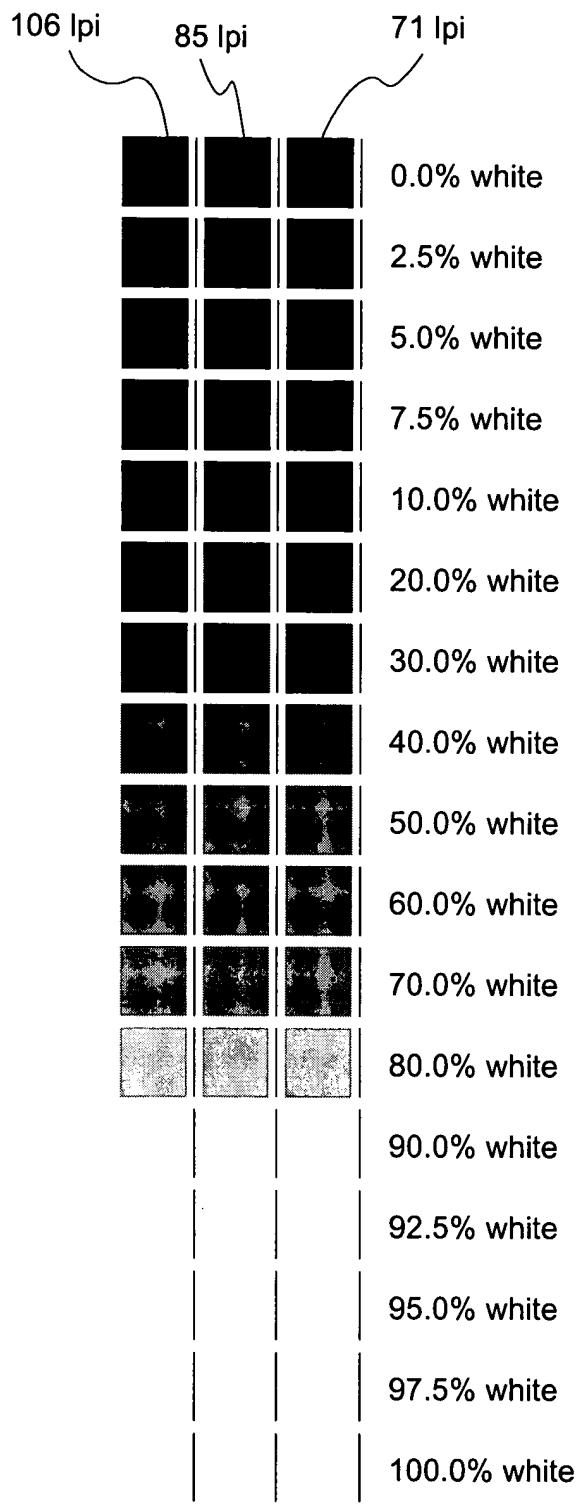


FIG. 12

default round round
106 85 71

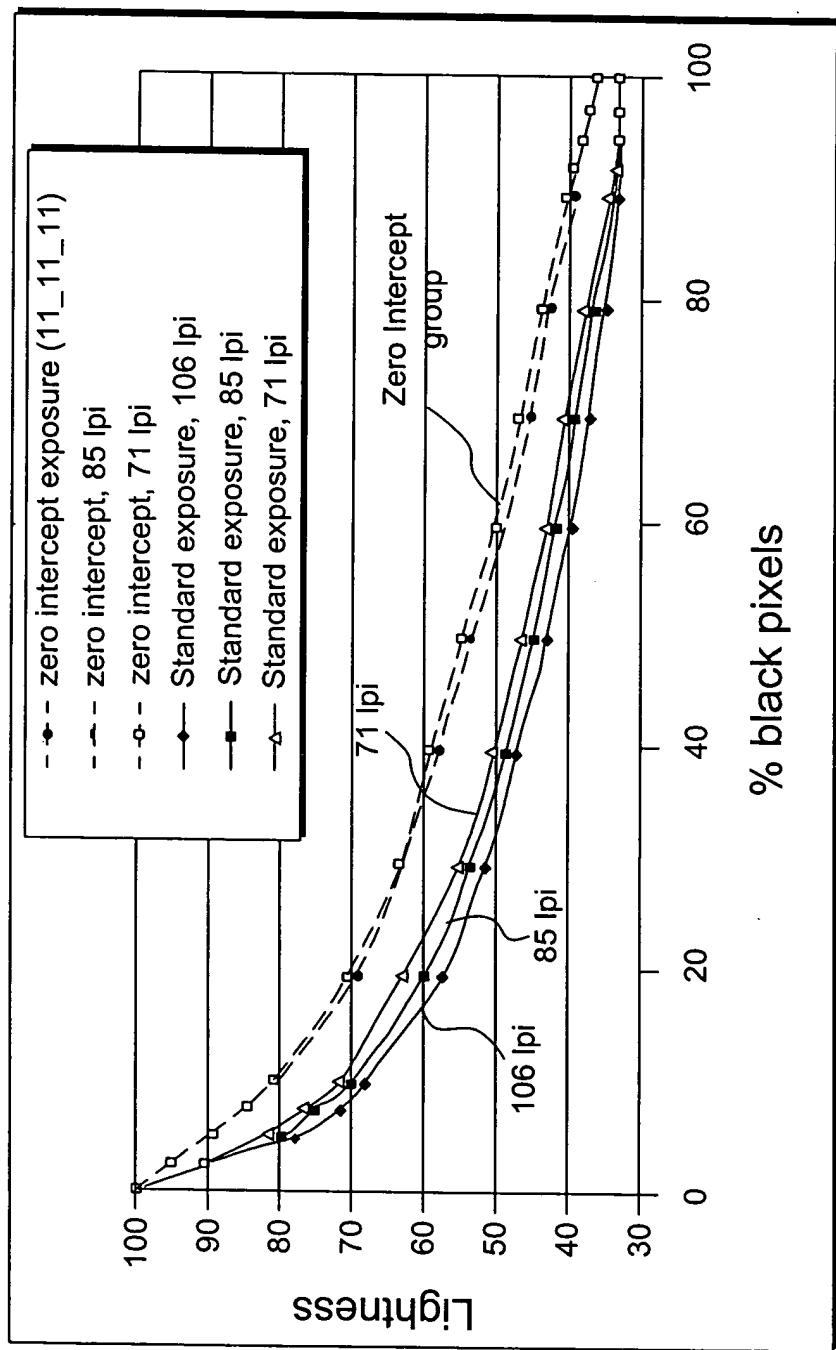


FIG. 13

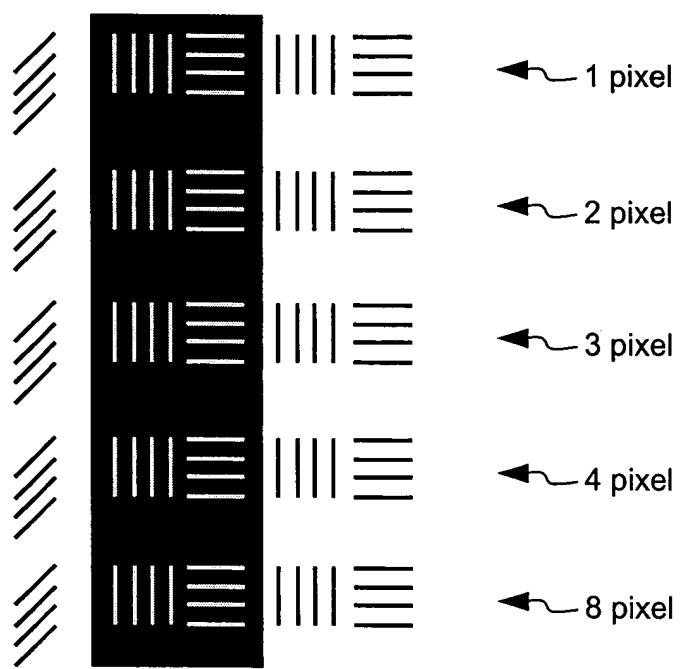


FIG. 14

FIG. 15

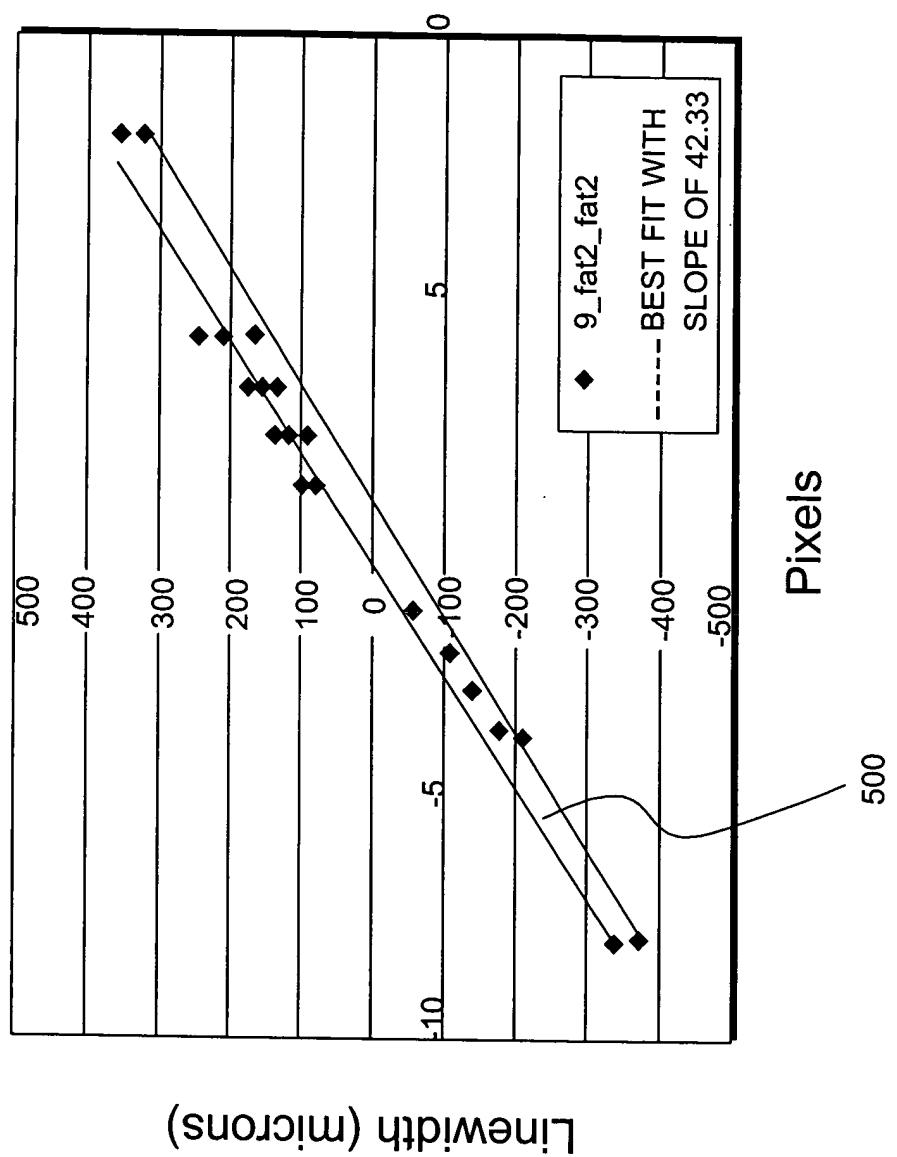
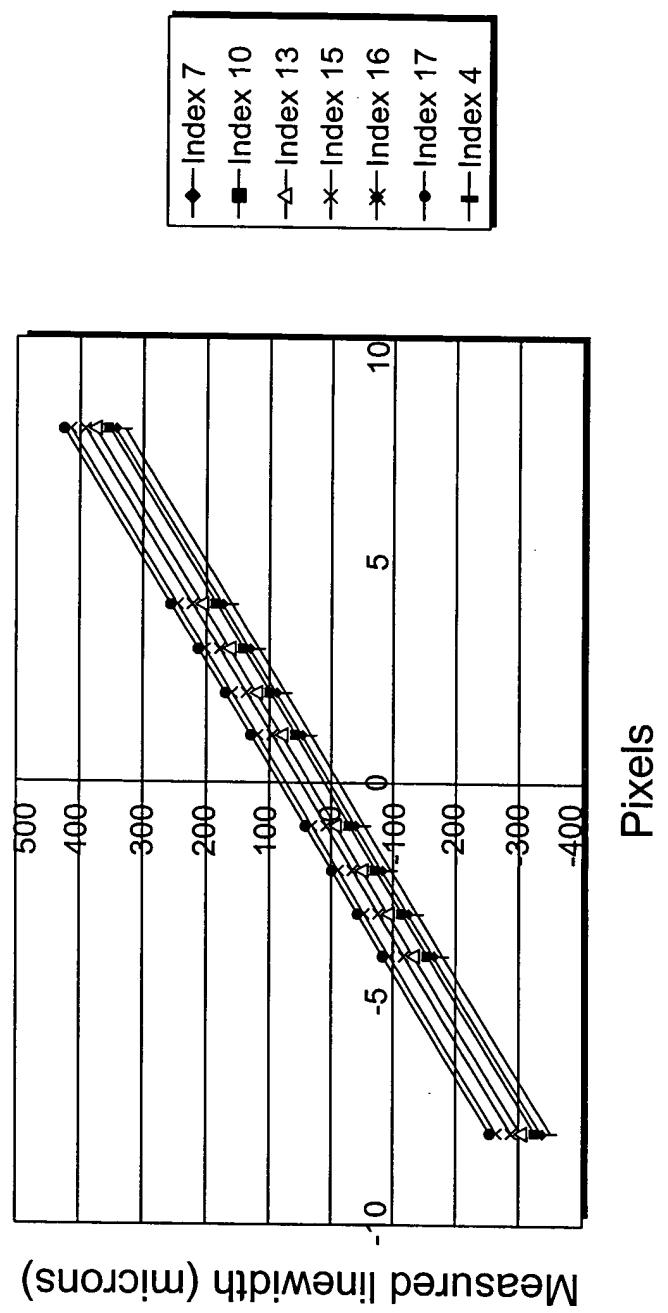


FIG. 16



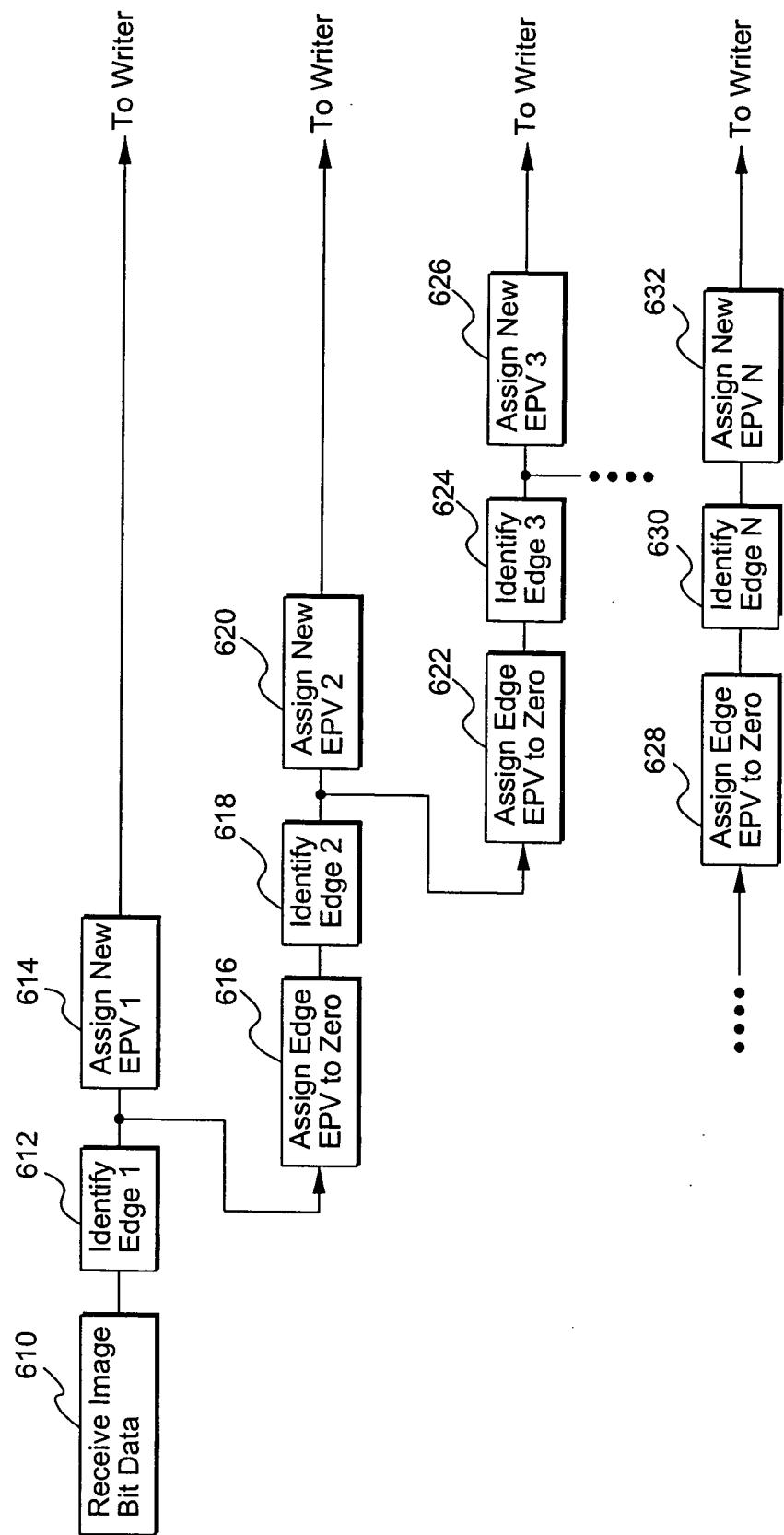


FIG. 17

FIG. 18a

b7	b6	b5
b4	PIQ	b3
b2	b1	b0

FIG. 18b

b₇ b₆ b₅ b₄ b₃ b₂ b₁ b₀

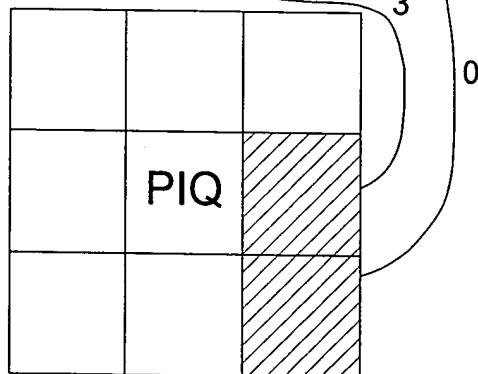
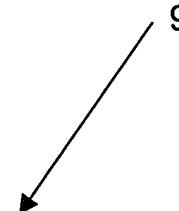


FIG. 18c

00001001

Fig. 18d



0	SE	S	S	SW	S	S	S	E	E	SE	SE	SE	SE	S	SE
W	SW	SW	S	W	SW	SW	SW	0	SE	S	S	SW	S	S	S
NE	E	SE	SE	0	SE	S	S	E	E	E	SE	E	E	SE	SE
NW	0	SW	S	W	SW	SW	S	NE	E	SE	SE	0	SE	S	S
N	NE	0	SE	NW	0	SW	S	NE	E	E	E	NE	E	SE	SE
NW	NW	W	SW	W	W	W	SW	N	NE	0	SE	NW	0	SW	S
N	NE	NE	E	N	NE	0	SE	NE	NE	E	E	NE	E	E	E
N	N	NW	0	NW	NW	W	SW	N	NE	NE	E	N	NE	0	SE
NW	0	SW	S	W	SW	SW	S	NE	E	SE	SE	0	SE	S	S
W	W	W	SW	W	W	SW	SW	NW	0	SW	S	W	SW	SW	S
N	NE	0	SE	NW	0	SW	S	NE	E	E	E	NE	E	SE	SE
NW	NW	W	SW	W	W	W	SW	N	NE	0	SE	NW	0	SW	S
N	N	NW	0	NW	NW	W	SW	N	NE	NE	E	N	NE	0	SE
NW	NW	W	W	NW	W	W	W	N	N	NW	0	NW	NW	W	SW
N	N	N	NE	N	N	NW	0	NE	NE	NE	E	N	NE	NE	E
NW	N	NW	NW	NW	NW	W	W	N	N	N	NE	N	N	NW	0